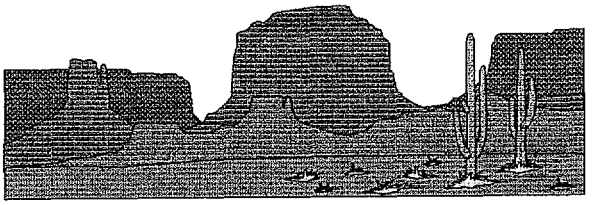
FACILITY REQUIREMENTS



DOUGLAS MUNICIPAL AIRPORT MASTER PLAN

CHAPTER V: FACILITY REQUIREMENTS

5.0 INTRODUCTION

One of the primary objectives of an Airport Master Plan Study is the determination of future requirements for the airport, including the airfield, the terminal areas, and all other areas within the airport property boundaries. This Airport Master Plan Study was developed pursuant to changes in demand and trends, as well as the application of FAA design criteria. Airport capacity and safety improvements were analyzed on the basis of physical feasibility and development constraints.

Based on the unconstrained forecast of aviation activity (Chapter IV), it is possible to describe in general the airport's physical and operational characteristics and the associated facilities needed to meet the projected 20-year demand. The purpose of this section is to establish general facility requirements for future development of the Douglas Municipal Airport.

As described in Chapter IV, Aviation Demand Forecasts, the existing and future design aircraft for Runway 3/21 at the Douglas Municipal Airport are those aircraft which have an Airport Reference Code of B-II and a maximum takeoff weight of 12,500 pounds or less, while the ultimate design aircraft will remain a B-II, but will weigh less than 25,000 pounds. The design aircraft for Runway 18/36 has an ARC of B-I and weighs 12,500 pounds or less.

5.1 NONSTANDARD CONDITIONS

As discussed in Chapter II, Facility Inventory, several physical conditions exist at Douglas Municipal Airport which do not meet FAA dimensional criteria or FAR Part 77 criteria. This section will give the Airport Sponsor a method of correcting or partially correcting these penetrations.

The Conical Surface (FAR Part 77) is penetrated by "D" Hill, located approximately one mile east of the airport. This knoll should be marked and lighted. The border patrol tower which is located approximately 2,000 feet from the approach end of Runway 21 will penetrate the Transitional Surface when a nonprecision approach is established to that runway. Therefore, the tower should also be marked and lighted.

The OFA (Object Free Area) and Runway Protection Zone (RPZ) off the end of Runway 3 is penetrated by the airport perimeter fence and an access road. These penetrations will be eliminated once the runway is extended by relocating the road outside the RPZ and the fence outside the OFA. The OFA and RPZ off the end of Runway 21 is penetrated by the fence and a city street, and the RPZ is additionally penetrated by the Geronimo Trail. Because the OFA penetration is minor, and it occurs at the far end of the OFA, the airport would be better served to keep the fence in its present location rather than try to relocate it outside of the OFA. As for the RPZ penetration, the City of Douglas should acquire an Avigation Easement for any property which is encompassed by the existing, future, and ultimate RPZ's so as to protect the airport environs from incompatible land uses and to protect people on the ground.

The penetrations to Runway 18/36's OFA, RPZ's, and Safety Areas will be eliminated when the runway is abandoned.

5.2 AIRSIDE FACILITY REQUIREMENTS

Airside facility requirements are based on FAA standards set out in Advisory Circular (AC) 150/5300-13, Airport Design. These guidelines relate to the runway environment and airport geometry and include criteria for Building Restriction Lines (BRL), Object Free Zones (OFZ), Runway Object Free Area (OFA), Runway Safety Areas (RSA), Runway Protection Zones (RPZ) and the Primary Surface. Definitions for these guidelines were previously discussed in Chapter II, "Facility Inventory". The specific dimensions as they relate to the ARCs of B-I and B-II are shown in Table V-1.

TABLE V-1
RUNWAY GEOMETRY FOR B-I and B-II AIRPORT REFERENCE CODES

DESCRIPTION	DIMENSIONAL CRITERIA FOR DOUGLAS MUNICIPAL AIRPORT
BRL	A minimum of 300 feet from the runway centerline and encompassing the RPZ's and ROFA's.
OFZ	For runways serving small aircraft (weighing 12,500 pounds or less) - 250 feet wide, centered longitudinally about the runway centerline, and extending 200 feet beyond each runway end. For runways serving larger aircraft (weighing over 12,500 pounds) - 400 feet wide, centered longitudinally about the runway centerline, and extending 200 feet beyond each runway end.
OFA	B-I: 400 feet wide, centered longitudinally about the runway centerline, and extending 500 feet beyond each runway end. B-II: 500 feet wide, centered longitudinally about the runway centerline, and extending 600 feet beyond each runway end.
RSA	B-I: 120 feet wide, centered longitudinally about the runway centerline, and extending 240 feet beyond each runway end. B-II: 150 feet wide, centered longitudinally about the runway centerline, and extending 300 feet beyond each runway end.
RPZ	Utility (visual approaches): Begins 200 feet beyond the end of the area usable for takeoff or landing. Inner width of 250 feet, outer width of 450 feet, and an overall length of 1,000 feet. Visual (large aircraft): Begins 200 feet beyond the end of the area usable for takeoff or landing. Inner width of 500 feet, an outer width of 700 feet, and an overall length of 1,000 feet. Nonprecision (large aircraft): Begins 200 feet beyond the end of the area usable for takeoff or landing. Inner width of 500 feet, outer width of 1,010 feet, and an overall length of 1,700 feet.
PRIMARY SURFACE	Utility (visual approaches): 250 feet wide, centered longitudinally about the runway centerline. Ending at each end of a non-paved runway, or extending 200 feet beyond each end of a paved runway. Visual: 500 feet wide, centered longitudinally about the runway centerline. Ending at each end of a non-paved runway, or extending 200 feet beyond each end of a paved runway. Nonprecision: 500 feet wide, centered longitudinally about the runway centerline. Ending at each end of a non-paved runway, or extending 200 feet beyond each end of a paved runway.

Source: FAA AC 150/5300-13, Airport Design and FAR Part 77, Objects Affecting Navigable Airspace

5.2.1 Runway Requirements

Length and Width: Information which is required to execute the FAA computer software program "Runway Lengths Recommended for Airport Design" include airfield elevation, maximum mean temperature of the hottest month, the effective gradient for the runway, and the design aircraft group expected to use the facility. The following information pertains to the Douglas Municipal Airport:

Field Elevation	4,173 Feet
Maximum Mean Temperature of the Hottest Month	93.9°F
Runway 3/21 Effective Gradient	32 Feet
Runway 18/36 Effective Gradient	1 Foot

• *The actual difference in feet from runway end to runway end is required to run the FAA software program and is listed as the effective gradient. However, the effective gradient is usually shown as a percent, which is 0.006% for Runway 3/21 and 0.0002% for Runway 18/36 at the Douglas Municipal Airport.*

Various recommended runway lengths according to the FAA's Airport Design program are shown for both small and large aircraft types in Table V-2. These differing lengths are associated with varying percentages of the aircraft fleet and associated takeoff weights.

Primary Runway

Length/Width: Based on the data in Table V-2 and the existing, future, and ultimate design aircraft groups at Douglas Municipal Airport, Runway 3/21 should have a length of 5,760 feet within the first five years of this study. In the 15 to 20 year time frame, the runway should be extended to 6,710 feet to accommodate 75 percent of large aircraft at 60 percent useful load. Chapter VI, Development Alternatives, will discuss alternatives for these runway extensions. The width of Runway 3/21 should also meet the recommended width of 75 feet for runways having an ARC of B-II.

TABLE V-2
EXISTING AND RECOMMENDED RUNWAY LENGTHS FOR DOUGLAS MUNICIPAL AIRPORT

	Runway 3/21 Length	Crosswind Runway Length[1]
Existing	5,400 feet	4,146 feet
*Recommended		
Smaller Aircraft (< 12,500 lbs.)	5,760 feet	4,608 feet
Larger Aircraft (< 60,000 lbs.)		
75 percent of these planes at 60 percent useful load	6,710 feet	5,368 feet
75 percent of these planes at 90 percent useful load	8,920 feet	7,136 feet
100 percent of these planes at 90 percent useful load	10,950 feet	8,760 feet

**FAA AC 150/5300-13 Airport Design*

[1] *Recommended crosswind runway lengths equal 80 percent of the recommended primary runway length.*

Strength: Runway strength requirements are normally based upon the design aircraft which may be expected to use an airport on a regular basis. Runway 3/21 currently has a strength of 6,000 pounds Single Wheel Gear (SWG), which is not adequate for the existing and future design aircraft. Runway 3/21 should be strengthened to 12,500 pounds SWG at the time of the first runway extension. Once the design aircraft group increases to large aircraft, the runway should be strengthened to 25,000 pounds SWG.

It is also a recommendation of this Master Plan that a runup area, or holding bay, be constructed at the end of Runway 21. A holding bay allows aircraft to do their pre-takeoff checks on the aircraft and still remain out of the path of taxiing and landing aircraft.

Crosswind Runway

As mentioned in Chapter II, Facility Inventory, wind conditions at Douglas Municipal Airport according to its users dictate the need for a crosswind runway. Further discussions with the airport users indicate that the current crosswind orientation does not give adequate coverage for the wind conditions. Based on this input, the recommendation of this study is to construct a new crosswind

runway with a 13/31 orientation, and discontinue use of Runway 18/36. To verify this crosswind runway orientation, however, an Automated Weather Observation System (ASOS) should be installed at the airport to collect adequate wind data prior to actual construction. The crosswind runway should be constructed within the 10 to 15 year time frame.

Length/Width: The FAA recommends that crosswind runways be 80 percent of the primary runway length. At the time of the crosswind construction, Runway 3/21 will be 5,760 feet. Therefore, the recommended crosswind runway length is 4,600 feet. Because the design aircraft group for the crosswind runway is a B-I weighing 12,500 pounds or less, the recommended runway width is 60 feet.

Strength: The crosswind runway should have a strength equal to 12,500 pounds to accommodate its design aircraft group.

5.2.2 Taxiway Requirements

Length/Width: The partial parallel taxiway to Runway 3/21 should be extended to a full length parallel taxiway. The taxiway meets the recommended width of 35 feet, and also the recommended separation from the runway centerline of 240 feet.

It is not recommended at this time that the recommended crosswind Runway 13/31 have a parallel taxiway. However, this should not be eliminated from consideration in future planning efforts by the City of Douglas.

Strength: At the minimum, Runway 3/21's parallel taxiway should be maintained at a strength equal to that of the runway pavement, or 12,500 pounds SWG for existing and future conditions, and 25,000 pounds SWG for ultimate conditions.

5.2.3 Approach Aids

To enhance the safety of operations at the Douglas Municipal Airport, the City should install Runway End Identification Lights (REILs) on both ends of Runway 3/21 and Runway 13/31.

REILs are a pair of synchronized flashing lights located laterally on each side of the runway threshold. They provide rapid and positive identification of the approach end of a runway.

5.2.4 Navigational Aids

At the present time, the Douglas Municipal Airport does not have a nonprecision instrument approach. The City of Douglas should plan for a straight-in nonprecision approach to Runway 21. This is justified as a result of the new Loran-C and GPS approaches which are being developed for both large and small airports throughout the United States.

Loran-C is an alternative system capable of providing nonprecision approaches into an airport. Loran-C instrument approaches permit all-weather landings and increase the utility of an airport.

Another system which has significant potential is the Global Positioning System (GPS). Like Loran-C, GPS can provide inexpensive approaches for all sizes and types of airports throughout the United States. Developed by the United States Department of Defense for military use, GPS is freely available to private and commercial users alike. With its highly accurate global coverage and ability to resist electronic interference (unlike Loran-C), GPS is posed to become the foundation navigation system for the world.

Both Loran-C and GPS nonprecision approaches do not require additional facilities on or near the airport. This would result in a cost-effective nonprecision approach to the Douglas Municipal Airport without a significant investment by the airport sponsor. Although GPS and Loran-C approaches have not yet been approved by the FAA, the FAA has committed to accelerating the process to accomplish this goal. By the time Douglas Municipal Airport operations dictate the need for a nonprecision approach, it is likely that at least one or both of these approaches will be approved.

However, should a Loran-C or GPS approach be delayed, then a non-directional beacon (NDB) providing a nonprecision approach to Runway 21 should be considered. The NDB should be located as an outer marker in the event a Loran-C or GPS approach is

commissioned in the future. This would provide additional electronic navigation for these types of approaches.

5.2.5 Automated Surface Observation System (ASOS)

The airport sponsor should acquire an Automated Surface Observation System (ASOS) for the Douglas Municipal Airport. The ASOS will provide information twenty-four hours a day to aircraft intending to use the airport. This system would provide general aviation pilots using the Douglas Municipal Airport with valuable real time information on weather conditions such as ceiling, precipitation, temperature and altimeter readings.

5.2.6 Airfield Lighting and Signage

Airfield lighting systems are particularly important to pilots flying into an airport that does not have an Air Traffic Control Tower or is not manned continuously during a 24-hour period. Runway 3/21 is currently equipped with pilot controlled Medium Intensity Runway Lights (MIRLs) and Precision Approach Path Indicators (PAPIs). The MIRLs and PAPIs are pilot controlled, and are activated by five clicks of the aircraft microphone. This lighting is adequate for Runway 3/21 throughout the twenty year planning period. Runway 13/31, when constructed, should be equipped with Low Intensity Runway Lights (LIRLs).

Runway 3/21's parallel taxiway currently has Medium Intensity Runway Lights (MITLs). This type of lighting is adequate and should also be installed along the taxiway extension.

No guidance or instruction signs currently exist on the airfield. The installation of instructional signs at the Douglas Municipal Airport should be completed to enhance aircraft safety on the ground.

5.3 LANDSIDE FACILITY REQUIREMENTS

A list of general aviation area improvements was developed after an on-site inventory, discussions with the FBO, and a thorough analysis of FAA planning guides which relate to facility requirements for forecasts of general aviation operations. Future facility requirements for based aircraft

can be computed by making a determination of the number of tiedown locations, number of T-hangars and number of conventional type hangars required.

5.3.1 Hangar Facilities

As described in the Facility Inventory chapter, Douglas Municipal Airport currently has two conventional type hangars which hold eleven aircraft. Conventional hangars usually accommodate larger aircraft or corporate fleets, and their size and capacity vary according to the manufacturer and the specifications of the airport owner or operator. Douglas Municipal Airport also has ten single storage units, or T-Hangars. T-hangars usually accommodate small aircraft.

New hangar development will keep pace with the increase in based aircraft due mainly to the high repair cost to aircraft from damage sustained from extreme weather conditions such as high temperatures in the summer and the effects of sand and wind. The forecast of based aircraft estimates approximately 34 aircraft will be based at the Douglas Municipal Airport by the year 2014. At the present time, approximately 75 percent of the based aircraft are hangared with the remaining 25 percent tied down. If hangar development occurs as recommended, it is expected that the 75 percent/25 percent ratio will remain the same throughout the twenty year planning period.

Increases in based aircraft will increase the demand for T-Hangar development at the airport, while transient aircraft needs will undoubtedly point towards conventional type hangar development. In this case, Douglas Municipal Airport should have sufficient conventional hangar space to accommodate the itinerant aircraft which operate into the airport. The recent installation of ten T-hangars at the airport allows a high percentage of the based aircraft to be hangared, and should be sufficient space for most of the twenty year planning period. Based on this information, it is recommended that this air facility have a total of 2 new conventional hangars by the year 2014. Additional T-hangars should be built as local based aircraft needs warrant. Table V-3 lists the hangar requirements for Douglas Municipal Airport. Hangar rental and leasing options are discussed in the Appendices under Minimum Standards for Fixed Base Operators.

TABLE V-3
GENERAL AVIATION HANGAR FACILITY REQUIREMENTS
DOUGLAS MUNICIPAL AIRPORT

Year	Conventional	T-Hangar	Total
Existing			
1993	2	10	12
Forecast			
1994	2	10	12
1998	3	10	13
2004	3	10	13
2014	4	10	14

5.3.2 Aircraft Parking Apron

Tiedown Requirements: Determining the number of tiedowns required at an airport involves an estimation of the number of local and itinerant aircraft that are expected to be parked on the apron at any given time. As stated earlier, approximately 25 percent of the based aircraft at Douglas Municipal Airport are tied down, and this percentage is expected to remain the same throughout the twenty year planning period. Itinerant aircraft will also require several tiedown spaces. The amount of itinerant aircraft planned for in this study is equal to 35 percent of the based aircraft number.

Apron Space Requirements: Generally speaking, an apron tiedown area must allow approximately 360 square yards per aircraft. This square yardage per aircraft provides adequate space for tiedowns, circulation and fuel truck movement. However, this square yardage does not always take into account the area needed to meet standard distance requirements from buildings, taxilanes, taxiways, and fuel facilities that might be needed for existing conditions at an airport. By using the number of tiedowns required throughout the twenty year planning period along with the recommended 360 square yards per aircraft, a minimum apron space area required for tiedowns at this airport can be determined. But, it is important to remember that this recommended area may be smaller than needed if it is discovered that the tiedowns need to be relocated or situated

further from buildings or other objects. The apron at the Douglas Municipal Airport requires a minimum area of 7,560 square yards to allow for 21 tiedown spaces by the year 2014, as shown in Table V-5. The main apron currently has approximately 15,000 square yards (SY) of area.

TABLE V-4
TIEDOWN REQUIREMENTS
DOUGLAS MUNICIPAL AIRPORT

YEAR	BASED AIRCRAFT	LOCAL AIRCRAFT ON APRON	ITINERANT AIRCRAFT ON APRON	TOTAL TIEDOWNS
Existing				
1993	26	6	7	13
Forecast				
1994	27	7	10	17
1999	28	7	10	17
2004	30	8	11	19
2009	32	8	11	19
2014	34	9	12	21

TABLE V-5
APRON SPACE REQUIREMENTS
DOUGLAS MUNICIPAL AIRPORT

Year	Total Tiedowns Required	Minimum Pavement Required (in S.Y.)
1994	17	6,120
1999	17	6,120
2004	19	6,840
2009	19	6,840
2014	21	7,560

** S.Y. = Square Yards*

Summary: The Douglas Municipal Airport currently has adequate tiedown space to accommodate the needs of its local and itinerant users throughout the twenty year planning period. However, eleven of the 21 existing aircraft tiedowns are in the grass or dirt adjacent to the apron. It is recommended that the area where these tiedowns are located be paved and the tiedowns be installed in the pavement. This will require the removal of the existing segmented circle with lighted wind cone. A new one should be located closer to the runway system.

5.3.3 Fencing

The existing fence which borders the Douglas Municipal Airport property is constructed of barbed wire to a height of 4 feet. It is recommended that any fencing built along future property boundaries be constructed to the same height and with the same materials.

5.4 LAND USE COMPATIBILITY AND CONTROL

Zoning: The City of Douglas Zoning ordinances and maps provided by the City of Douglas indicate that the Douglas Municipal Airport Property and surrounding areas are zoned as a Special Use District. This District permits uses such as racetracks, fairgrounds, baseball or football stadiums, rodeo grounds and arenas, drive-in theaters, refineries, golf courses, and shooting ranges. All of these are considered compatible land uses with airport operations. However, the Special Use District also allows hospitals, sanatoriums, penal or correctional institutions, colleges and universities, all of which are not permitted uses. The only building height restriction within this District is that the buildings must comply with restrictions in the nearest different zoning district. Appendix B of this study is a Model Zoning Ordinance which should be adopted by the City of Douglas and Cochise County (for the land outside of city limits) which would control the heights of objects within the airport's area of influence and also restrict the types of land uses within this same area.

Landfills/Treatment Plants: FAA Order 5050.4A, Environmental Handbook, states that landfills and/or treatment plants should not be located within a 5,000 foot radius of an airport which has piston-type aircraft operations or within a 10,000 foot radius of an airport which has turbine or jet type operations. The nearest landfill and treatment plant are located to the west of the City of Douglas, well beyond the 5,000 foot or 10,000 foot radius.

5.5 SUMMARY

In summary, the Facility Requirements for the Douglas Municipal Airport are based on the type of aircraft using the airport now and throughout the planning period. The existing and future Airport Reference Code for Runway 3/21 at Douglas Municipal Airport is a B-II weighing 12,500 pounds or less, with an ultimate design aircraft of B-II weighing less than 25,000 pounds. The crosswind runway's design aircraft group is a B-I weighing 12,500 pounds or less.

Several recommendations come from the facility requirements section of the study:

(1) Runway 3/21 should be extended to 5,760 feet, widened to 75 feet, and strengthened to 12,500 pounds SWG within the first five years of this study to accommodate aircraft in the existing design aircraft group. An additional extension to 6,710 feet should be completed within the 15 to 20 year time frame, along with a strengthening overlay to 25,000 pounds SWG;

(2) A crosswind runway oriented 13/31 should be constructed to a length of 4,600 feet, width of 60 feet, and strength of 12,500 pounds SWG within the 10 to 15 year time frame. The runway should also be equipped with LIRLs;

(3) The partial parallel taxiway to Runway 3/21 should be extended to a full length parallel taxiway within the 5 to 10 year time frame. The taxiway should also have a strength of 12,500 pounds SWG;

(4) REILs should be installed on both ends of Runway 3/21 and Runway 13/31;

(5) An ASOS should be installed on the airfield;

(6) Airfield signs should be installed at the time of the crosswind runway construction;

(7) The aircraft apron should be expanded to accommodate those tiedowns currently in dirt within 5 to 10 year time frame;

(8) Two new conventional hangars should be constructed by the year 2014;

(9) A nondirectional beacon should be acquired in the event a Loran-C or GPS approach cannot be established into the airport within the twenty year planning period;

(9) Other recommendations: City of Douglas should adopt a model zoning ordinance to limit the heights of objects around the airport, and also ensure that no new landfills or treatment plants be constructed within 10,000 feet of any runway end at the airport.

Tables V-6 and V-7 provide a summary of recommended development actions during the planning period.

TABLE V-6
RECOMMENDED LANDSIDE FACILITIES
DOUGLAS MUNICIPAL AIRPORT

FACILITY	EXISTING	1999	2009	2014
HANGAR SPACE				
Conventional	2	3	3	4
T-Hangar	10	10	10	10
AIRCRAFT PARKING				
Tiedowns	21	19	19	21

TABLE V-7
RECOMMENDED AIRSIDE FACILITIES
DOUGLAS MUNICIPAL AIRPORT

FACILITY	EXISTING	1999	2004-2009	2014
RUNWAY 3/21				
Length	5,400 feet	5,760 feet	5,760 feet	6,710 feet
Width	60 feet	75 feet	75 feet	75 feet
Strength	6,000 lbs. SWG	12,500 lbs. SWG	12,500 lbs. SWG	25,000 lbs. SWG
CROSSWIND RUNWAY				
Length	4,146 feet	4,146 feet	4,600 feet	4,600 feet
Width	98 feet	98 feet	60 feet	60 feet
Strength	----	----	12,500 lbs. SWG	12,500 lbs. SWG
TAXIWAYS				
R/W 3/21 Parallel:				
Length	Partial	Partial	5,760 feet	5,760 feet
Width	35 feet	35 feet	35 feet	35 feet
Strength	Not known	Not known	12,500 lbs. SWG	12,500 lbs. SWG
R/W 18/36 Parallel:				
Length	4,146 feet	4,146 feet	Use Discontinued	Use Discontinued
Width	50 feet	50 feet		
Strength	----	----		
AIRCRAFT APRON				
Pavement Area	15,000 S.Y.	20,555 S.Y.	20,555 S.Y.	20,555 S.Y.
Tiedowns	21	21	21	21
NAVIGATIONAL AND VISUAL AIDS	Beacon PAPIs	Beacon PAPIs	Beacon PAPIs REILs	Beacon PAPIs REILs NDB
MARKING				
R/W 3/21	Basic	Basic	Basic	Nonprecision
Crosswind R/W	----	----	Basic	Basic
LIGHTING				
R/W 3/21	MIRLs	MIRLs	MIRLs	MIRLs
R/W 18/36	LIRLs (nonstandard)	LIRLs (nonstandard)	Use Discontinued	Use Discontinued
R/W 13/31	----	----	LIRLs	LIRLs
T/W Lighting	MITLs	MITLs	MITLs	MITLs